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MARKETING RESEARCH REPORT NO. 814

A Comparison of Returns to Poultry Growers

- Under Contract
- Operating Independently

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PREFACE

The objective of the study reported here was to compare returns to table egg, broiler, and turkey producers operating under different contract arrangements and operating independently. Assumptions used throughout the study were considered to be realistic for the above-average grower--that is, for the efficient manager who is able to keep his costs down and realize above-average profit.

The results of the study can be adapted by growers and others to conditions which vary from those assumed. Comparison of the returns from the different production arrangements will enable producers to select the arrangements that will give them the greatest returns.

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Washington, D.C. February 1968

HIGHLIGHTS

Latest estimates indicate 95 percent of the broilers and 50 to 60 percent of the turkeys in this country are produced under some type of contractual arrangement. No national figures are available on the percent of eggs produced under contracts. Risk-sharing contracts are the type most used in the production of broilers, turkeys, and eggs. Under these contracts most key decisions about production and marketing are transferred to the contractor along with most production risks. Under risk-sharing contracts the grower typically provides housing and labor and the contractor feed and other inputs.

Risk-sharing contracts vary widely in payment plans. An analysis of contracts used in 1964 and 1965 showed net returns to growers varying from \$1,295 to \$4,815 for growing 100,000 broilers under similar conditions. Returns for growing 10,000 turkeys ranged from \$1,614 to \$3,138 under similar conditions, and returns for 10,000 layers ranged from \$2,454 to \$4,304 under similar conditions.

Contracts generally insulate grower returns against the full impact of changes in product and input prices. Such insulation provides a guarantee against excessive losses but also places a limit on grower profits.

A COMPARISON OF RETURNS TO POULTRY GROWERS
...Under Contract ...Operating Independently

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INTRODUCTION

The organization of the poultry industry has changed considerably in the past 20 years. A major development is the increasing use of contracts to coordinate the various activities involved in production and marketing of poultry products. Latest estimates are that probably 95 percent of the chicken broilers, 50 to 60 percent of the turkeys, and 30 to 35 percent of the eggs are produced under some type of contractual arrangement between the grower and other firms associated with the industry. The type of contract used almost exclusively in broiler production and most frequently in turkey and egg production is one in which all or most of the price risk is assumed by the contracting firm. The contractor furnishes the chickens or turkeys and the feed, and retains ownership of these production inputs. The grower furnishes housing, equipment, and labor. Other production items may be furnished by either party depending on the individual contract.

Contractors want contracts that promote efficient production of quality products, and growers want contracts that will provide them a satisfactory return for their labor and other inputs. Contracts have been used for more than 20 years in certain segments of the poultry industry, but changes in these contracts over time indicate a need for continuing evaluation.

The main objective of the study reported here was to estimate returns to growers under different types of contracts with various combinations of prices and other factors that influence grower returns. Another objective was to compare the returns to contract growers with returns to independent growers.

The report is not intended to serve as a guide for writing contracts but rather as a framework that can be used by growers and others in identifying the factors affecting returns under various contract payment plans and in estimating and evaluating returns that might be expected under various production arrangements.

Contracts have been analyzed for the three major segments of the poultry industry: broilers, turkeys, and table eggs. The study covered only those production contracts in which the ownership of the turkeys, broilers, or laying hens was retained by the contractor. Other types of production contracts are discussed in the brief history in each section of this report.

PROCEDURE

A number of contracts used by growers in 1964 and 1965 were examined, and one of each type used in contract production of turkeys, broilers, and eggs was selected as representative. Cost budgets were constructed for operations of specified sizes--100,000 broilers, 10,000 turkeys, 10,000 layers--with better than average management practices. Using these cost budgets and appropriate prices and other data, returns to labor and management were estimated for contract production under each of the representative contracts and for production by independent growers.

This type of analysis has several shortcomings which limit the conclusions that may be drawn.

Because the limited number of contracts available made it impossible to analyze contracts from different geographic areas, costs were budgeted to represent all the United States and not a specific area. Geography does, in fact, affect the costs of feed, housing, and other inputs. However, the budgets are constructed so that the effect of changes in the cost of some of the major inputs, such as feed, can be analyzed.

Mortality rates and feed conversion rates also vary among regions. Allowances for these differences can best be made by persons using these analyses.

Seasonal variation in costs are not reflected in the budget costs, since the budgets are for 1-year periods.

Many other factors that affect returns under different contracts were not reflected in the budgets. For instance, contractors change the combination of ingredients in feed as the prices of the ingredients change, and these changes may increase or decrease the returns under a given contract as feed conversion and growth rates are changed.

The results of the contract comparisons are valid only under the specific assumptions made for each comparison. They do, however, provide a framework for use by others in comparing different types of contracts. They also aid in isolating the effect of changes in the main factors that influence growers' returns, and demonstrate how changes in these factors change the relative profitableness of production under various contracts or of independent production.

Contract Production in the Broiler Industry

Broiler production increased during World War II, and since then has continued to expand. Some of the expansion resulted from continued growth in older production areas, but the majority came through the introduction of new producing areas. During the middle and late thirties, production centered in the Delmarva area of the United States. Between 1939 and 1944, production in the Southern States began to increase and, by 1955, the three States leading in broiler production were Georgia, Texas, and Arkansas. In 1966, the three leading States were Georgia, Arkansas, and Alabama.

Most of the contracting production began after World War II. Types of contracts used in broiler production have changed over time within areas, and many have disappeared in one area and later been accepted in another. During the rapid expansion after 1945, feed firms were the major contractors, many of them moving from the extension of credit by open account financing to contract production. Under open account financing, the grower purchased feed, chicks, and other supplies from the feed dealer and did not pay for them until the broilers were sold. The grower had title to the broilers and was responsible for payment of the entire account.

The change from open account financing to other types of financing arrangements and contracts has not been the same in all areas. As early as 1952 there was a trend toward basic guarantee contracts in some parts of the South. Under these contracts, the contractor supplied the feed, chicks, or other production items to the grower who was guaranteed a specific return per pound or head. Another contract used during this early period of contract growth, particularly in the Delmarva area, was the profit share contract in which the contractor furnished the feed, chicks, and other production items and charged them to the grower's account at prices higher than the cash price for these items. After the cost of supplies furnished by the contractor was deducted from the proceeds of the enterprise, the remaining "profit" was split between the grower and the dealer. If the proceeds were less than the cost of the items furnished, the contractor absorbed the loss. Both these contracts represented a shifting of part or all of the risk of production from the grower to the contractor.

A major drawback of the basic guarantee contract was thought to be the lack of incentive for the producer to do a good job.

Modifications of the basic guarantee contract evolved from specific problems or objectives of the contractor. A profit-sharing clause, in which the basic guarantee was counted as a cost in determining profit, was the first modification of this contract. Over time, basic guarantee contracts were further modified by adding feed conversion and other incentive clauses. Contracts with feed efficiency clauses accomplished the purpose of rewarding growers with the lowest feed conversion rate but did not necessarily result in the lowest cost of production, as growers sometimes spent excessive amounts on medication to improve feed conversion. One modification was to pay a premium to the grower for heavier birds to compensate for the fact that feed conversion efficiency decreases as the broilers are grown to larger weights.

One popular type of contract contained a basic guarantee with a bonus clause for feed conversion efficiency and another bonus clause based on the market price for broilers as quoted in U.S. Department of Agriculture market news reports. Since the live-weight price of broilers has not been quoted in these reports for some areas of the South since October 1, 1965, many contracts which used these market quotations have been changed and others now use State quotations.

Recently, contracts with guarantee payment plans containing bonus clauses based on the cost of production have been used. One contract uses a mathematical system to predict average cost per pound for all birds to be marketed in a 2-week period. Payment to growers varies above a basic amount per thousand birds started, depending on production costs in relation to the average production costs for all growers with a particular contractor.

Another contract provides for grower bonuses according to how an individual grower's costs of production compare with the production cost average of all growers associated with the contractor during a specified previous time period. This type of bonus clause provides an incentive for growers and also limits the total payments a contractor will make. The amount the contractor pays in bonuses will vary only if the concentration of growers on a curve showing the cost distribution changes. If all growers decrease their costs but maintain the same relative positions on the curve, the contractor will gain because the cost of production will be lower for him and the total bonus paid will not increase. With such a bonus clause, no matter how efficient the growers are and how much they improve their efficiency, there will be a group of growers receiving the minimum payment.

Types of Contracts Evaluated

The following representative contracts were evaluated. Details of the payment plans of these contracts are given in appendix A.

Contract A (feed conversion)

Payment in this contract is based on feed conversion rate--that is, on the pounds of feed required to produce 1 pound of meat. The grower is paid from 1 to 2½ cents per pound depending on feed conversion rate.

Contract B (prime cost--minimum guarantee per thousand)

The payment to the grower depends on the relationship of his production cost to the average production cost of all growers with the contractor during the 2 weeks prior to settlement. There is a minimum guarantee of $50 per thousand broilers started; all profits above the guarantee are divided equally.

Contract C (cost of production grouping)

Growers are paid from $1\frac{1}{2}$ to $2\frac{1}{4}$ cents per pound depending on their production cost in relation to the contractor's grower with the lowest production cost per pound.

Contract D (feed conversion--body weight)

Growers receive a base payment of $1\frac{1}{2}$ cents per pound. A bonus is paid to the growers based on feed conversion and average weight.

Contract E (prime production cost)

The grower receives 2 cents per pound plus or minus the full amount of the difference between his production cost and the average production cost for all growers, depending on whether his production cost is above or below the average. Regardless of cost of production, his minimum payment is guaranteed to be not less than 1.5 cents per pound.

Analysis of Contracts

Assumptions Used in Analysis

In all comparisons of production arrangements, feed for the independent grower is assumed to be priced at $5 less per ton than for the contract grower. The difference reflects the higher price charged by the contractor to cover his risks. Although feed is furnished by the contract firm and not paid for by the grower in contract production, its cost is important in determining the payment to growers in some of the contracts evaluated.

Assumptions relating to size of operation and production efficiency are given in table 1. The assumptions are for a better-than-average-grower. Estimated costs of production excluding labor and management are given in detail in table 2. Feed is valued at $85 per ton in table 2 and chicks are priced at $0.10 each. Fixed costs were calculated by applying the rates most frequently used in recent studies for determining the annual ownership costs of depreciation, interest, repairs, taxes, and insurance. All of the cost items in table 2 would apply to the independent grower; those which apply to the contract grower are summarized in table 3.

Because three contracts, B, C, and E, had payment plans based on the ranking of the contract grower's "prime production cost" (cost of production inputs furnished by the contracting firm), cost and production efficiency rates were estimated for a contracting firm's low and high cost growers under these types of contracts. This was necessary to determine how the budgeted contract grower's costs ranked with the costs of other growers for the same firm. This was done by varying factors such as feed conversion, mortality, and condemnation to represent changes in efficiency between the low and high cost grower. The estimated prime production costs for contracts B, C, and E are given in table 4 for low and high cost growers, for the better-than-average-grower represented in the cost budget, and for the average grower.

Table 1.--Assumptions underlying economic comparisons of broiler contracts

Item	Quantity
Broilers per lot	20,000
Lots per year	5
Broilers started per year 1/	100,000
Mortality, 2.5 percent of broilers	2,500
Broilers delivered to processing plant	97,500
Broilers passing inspection	95,550
Average weight per broiler, pounds	3.5
Gross weight delivered to processing plant, pounds	341,250
Condemnation in processing plant, 2 percent of gross weight, pounds	6,825
Net weight marketed, pounds	334,425
Feed per pound of broiler marketed, pounds	2.30
Estimated labor inputs per 100,000 broilers, hours	2,000

1/ Calculations based on 100,000 broilers with no allowance for replacements.

To investigate the advantages and disadvantages to growers of operating under various types of production arrangements, including noncontract production, three comparisons were made. First, a comparison was made of the effects of changes in feed conversion efficiency on returns to growers operating under each production arrangement. Second, the effects of changes in feed prices were compared. Third, the effects of changes in prices received for broilers were compared. In each of the comparisons all factors other than the one being analyzed remained constant.

Growers' Returns at Varying Levels of Feed Conversion Efficiency

The relationship of feed conversion efficiency to growers' returns for labor and management under the various production arrangements were investigated by holding the live-weight price of broilers at 15 cents per pound and feed cost at $85 per ton, and varying the assumed rate of feed conversion. The live-weight price of 15 cents is the average, to the nearest cent, of reported 1964-66 prices. The results are shown in table 5.

Generally, increased feed conversion efficiency (that is, a decrease in feed conversion rate) increased growers' gross and net returns, and decreased feed conversion efficiency decreased growers' gross and net returns. Since returns under contracts were affected by size of base payment, bonus, and penalty, if any, changes in feed conversion efficiency did not have the same effect on returns under all contracts. For the independent grower, any increase in feed efficiency would lower costs and thus result in a higher net return.

Table 2.--Cost budget: estimated costs, excluding labor and management, of producing 100,000 broilers annually in 5 lots of 20,000 each

	Total cost	Annual rate	Annual cost	Cost per net pound live
	Dollars	Percent	Dollars	Dollars
Fixed costs:				
Buildings--Depreciation and repair (16,000 sq. ft. @ $0.80) 1/	12,800	8	1,024	.00306
Equipment--Depreciation and repair (16,000 sq. ft. @ $0.35)	5,600	12.5	700	.00210
Buildings and equipment--Interest on average investment	9,200	6	552	.00165
Buildings and equipment--Insurance and taxes	18,400	2	368	.00110
Total fixed costs			2,644	.00791
Variable costs:				
Feed 2/			33,357	.09974
Chicks 3/			10,000	.02990
Medication			1,500	.00448
Litter			616	.00184
Insurance 4/			335	.00100
Heat			716	.00214
Electricity			381	.00114
Miscellaneous			200	.00060
Financing charges 5/			1,408	.00421
Total variable costs			48,513	.14505
Total cost			51,157	.15296

1/ Square feet of building needed estimated at .8 square feet per broiler housed at one time based on costs in the South.

2/ Feed valued at $85 per ton. (In tables comparing production arrangements, feed will be priced $5 higher per ton for contract growers than for independent growers.)

3/ Chicks cost $0.10 each.

4/ Insurance against loss of chickens by fire, etc.

5/ Financing charge used only in computing costs for independent producer.

Table 3.--Estimated cost of production items furnished by contract broiler grower for 100,000 broilers under various contract types

Production arrangement	Production item					Total grower cost excluding labor and management
	Fixed costs	Heat	Litter	Electricity	Miscellaneous	
	Dollars					
A	2,644	716	616	381	200	4,557
B	2,644	---	---	381	200	3,225
C	2,644	716	---	381	200	3,941
D	2,644	716	---	381	200	3,941
E	2,644	716	---	381	200	3,941

The changes in returns under the different production arrangements can best be compared by referring to figure 1.

Growers under contract B had the greatest returns under all three feed conversion rates. With a change in feed conversion rate from 2.3 to 2.2, however, the advantage of contract B over contracts E and C lessened. Under both B and E a bonus was paid for the increase in feeding efficiency, but the bonus under contract E was larger. Under contract C, the base payment increased with the increase in feeding efficiency, and the increase was larger than the bonus under contract B. The base payment under contract B did not change.

With a change in the feed conversion rate from 2.3 to 2.4, returns under all contracts decreased. The advantage of contract B over contract E increased. Under both contracts, penalty payments (bonuses become penalties as the feed conversion rate increases) were deducted from the base payments for the decrease in feed efficiency, and the penalty under contract E was greater than the penalty under contract B. Under contract D, bonus payments were possible but penalty payments were not imposed. With the decrease in feed conversion efficiency, returns under contract D became a base payment only, and decreased only slightly. The advantage of contracts B and E over contract D lessened considerably and contract D became slightly more favorable than contract C.

The independent grower would have received a lower return than any contract growers at conversion rates of 2.3 or 2.4. At a feed conversion rate of 2.2, returns to the independent grower would have been greater than to growers under contracts A and D.

Growers' Returns at Various Feed and Broiler Prices

The effect of changes in the price of feed and broilers on growers' returns is shown in descending order of net returns by production arrangement in tables 6 and 7. Total net returns to labor and management are shown in table 6, and net returns to labor and management per hour are shown in table 7.

Table 4.--Contractor's average prime costs for four broiler production cost levels

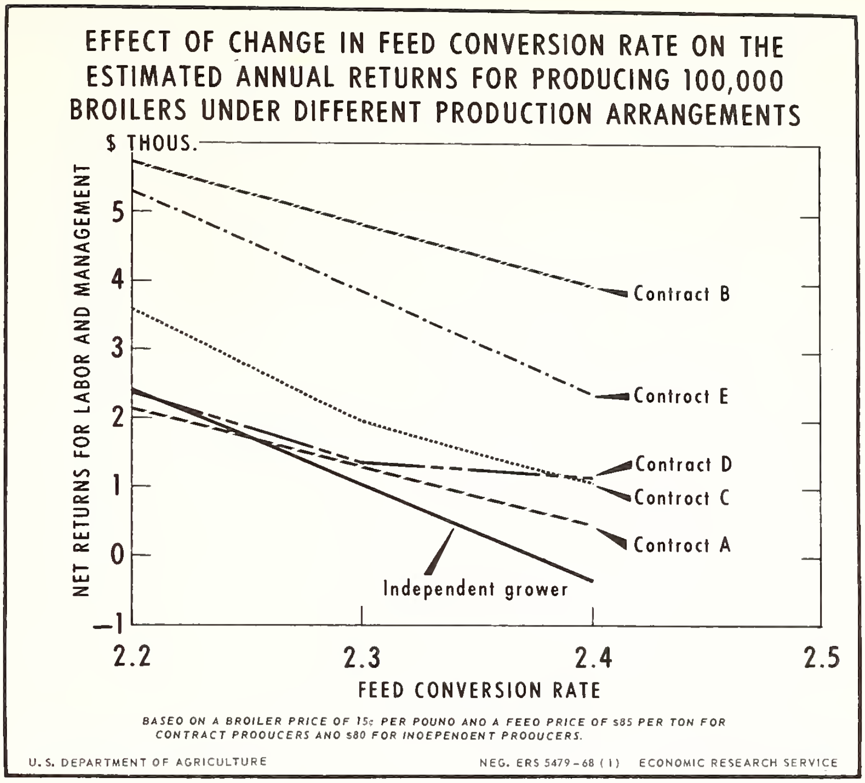
Item	Production cost level Low	Budgeted 1/	Average	High
Feed conversion based on gross weight	2.20	2.30	2.35	2.50
Mortality, percent	1.80	2.50	2.95	4.10
Gross weight marketed, pounds	343,700	341,250	339,710	335,650
Condemnation:				
Pounds	5,156	6,825	7,643	10,070
Percent	1.5	2	2.25	3
Net weight marketed, pounds	338,544	334,425	332,067	325,580
	Average prime cost per pound			
	------------Dollars------------			
Contract C:				
Feed 2/	.09492	.09974	.10223	.10954
Chicks 2/	.02954	.02990	.03012	.03071
Litter 2/	.00182	.00184	.00186	.00189
Medicine 3/	.00414	.00448	.00504	.00594
Insurance 4/	.00100	.00100	.00100	.00100
Other 4/	.00030	.00030	.00030	.00030
Total	.13172	.13726	.14055	.14938
Contract E:				
Feed	.09492	.09974	.10223	.10954
Chicks	.02954	.02990	.03012	.03071
Litter	.00182	.00184	.00186	.00189
Medicine and sanitation	.00444	.00479	.00504	.00624
Insurance	.00100	.00100	.00030	.00100
Total	.13172	.13727	.14055	.14938
Contract B:				
Feed	.09492	.09974	.10223	.10954
Chicks	.02954	.02990	.03012	.03071
Litter	.00182	.00184	.00186	.00189
Medicine	.00414	.00448	.00504	.00594
Insurance	.00100	.00100	.00100	.00100
Other	.00030	.00030	.00030	.00030
Fuel 5/	.00186	.00214	.00257	.00329
Total	.13358	.13940	.14312	.15267

1/ Above-average grower. Budgeted costs of above-average grower are given in table 3. 2/ Feed at $85; chicks and litter priced the same as in table 2 at all production cost levels. Variations in cost per pound due to influence of feed conversion, mortality, and condemnation. 3/ Medicine priced differently at each cost level. Low cost level assumed to have lower medication cost due to efficiency. 4/ Insurance and "other" costs priced at same per pound cost at all cost levels. 5/ Fuel priced differently at each cost level. Low cost level assumed to have lower fuel cost due to efficiency.

Table 5.--Estimated net returns to broiler growers for labor and management at specified rates of feed conversion under various production arrangements 1/

Production arrangement and feed conversion rate	Total return	Total grower cost	Net return	
			Annual	Per pound
	Dollars	Dollars	Dollars	Cents
Contract A:				
2.2	6,689	4,557	2,132	0.638
2.3	5,852	4,557	1,295	.387
2.4	5,016	4,557	459	.137
Contract B:				
2.2	8,900	3,225	5,675	1.697
2.3	8,040	3,225	4,815	1.440
2.4	7,180	3,225	3,955	1.183
Contract C:				
2.2	7,525	3,941	3,584	1.072
2.3	5,852	3,941	1,911	.571
2.4	5,016	3,941	1,075	.321
Contract D:				
2.2	6,313	3,941	2,372	.709
2.3	5,289	3,941	1,348	.403
2.4	5,119	3,941	1,178	.352
Contract E:				
2.2	9,234	3,941	5,293	1.583
2.3	7,785	3,941	3,844	1.149
2.4	6,335	3,941	2,394	.716
Independent:				
2.2	50,164	47,764	2,400	.718
2.3	50,164	49,156	1,008	.301
2.4	50,164	50,507	-343	.103

1/ Price of broilers set at 15 cents per pound, other assumptions in tables 1 and 2 unchanged. (Feed cost, $85 per ton for contract production; $80 for non-contract production.)


EFFECT OF CHANGE IN FEED CONVERSION RATE ON THE ESTIMATED ANNUAL RETURNS FOR PRODUCING 100,000 BROILERS UNDER DIFFERENT PRODUCTION ARRANGEMENTS

BASED ON A BROILER PRICE OF 15¢ PER POUND AND A FEED PRICE OF $85 PER TON FOR CONTRACT PRODUCERS AND $80 FOR INDEPENDENT PRODUCERS.

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Figure 1

Changes in the price of feed per ton would not affect the returns to growers under contracts A and D. Under certain conditions, changes in the price of feed could be a factor in the returns to a given grower under contract C, because the payments are dependent on the relationship of the grower's cost to the cost of other growers using this contract. Under the assumptions used in this study, however, a change in the price of feed does not change returns of contract C growers as a group.

Grower returns under contracts B and E would be affected by changes in the price of feed (table 6). With the price of broilers at 15 cents per pound, an increase in the price of feed from $80 to $100 per ton increases net returns for contract B $120 and for contract E $197. This is because contracts B and E pay a bonus depending on how much the growers' costs are below the average of other contract growers' costs. As the price of feed increases, the spread between the above-average grower's cost and the average grower's cost increases slightly because of the above-average grower's ability to attain greater conversion efficiency and keep the mortality rate low. This decrease in the above average grower's cost relative to the average cost for the group, results in the increase in net income for the above average grower as the price of feed increases. Because of the profit-sharing clause in contract B, this relationship does not hold for all feed prices when broilers are priced at 16 and 17 cents per pound.

Table 6.--Estimated annual net returns to growers for labor and management for 100,000 broilers under different production arrangements and with varying broiler and feed prices [1]

Broiler price per pound	Contract feed price per ton [2]				
	$80	$85	$90	$95	$100
	Net returns				
Cents	Dollars				
13	B 4,795	B 4,815	B 4,855	B 4,875	B 4,915
	E 3,794	E 3,844	E 3,891	E 3,941	E 3,991
	C 1,911	C 1,911	C 1,911	C 1,911	C 1,911
	D 1,348	D 1,348	D 1,348	D 1,348	D 1,348
	A 1,295	A 1,295	A 1,295	A 1,295	A 1,295
	I -3,680	I -5,681	I -7,682	I -9,684	I-11,686
14	B 4,795	B 4,815	B 4,855	B 4,875	B 4,915
	E 3,794	E 3,844	E 3,891	E 3,941	E 3,991
	C 1,911	C 1,911	C 1,911	C 1,911	C 1,911
	D 1,348	D 1,348	D 1,348	D 1,348	D 1,348
	A 1,295	A 1,295	A 1,295	A 1,295	A 1,295
	I -335	I -2,336	I -4,337	I -6,339	I -8,341
15	B 4,795	B 4,815	B 4,855	B 4,875	B 4,915
	E 3,794	E 3,844	E 3,891	E 3,941	E 3,991
	I 3,009	C 1,911	C 1,911	C 1,911	C 1,911
	C 1,911	D 1,348	D 1,348	D 1,348	D 1,348
	D 1,348	A 1,295	A 1,295	A 1,295	A 1,295
	A 1,295	I 1,008	I -993	I -2,995	I -4,997
16	I 6,353	B 4,815	B 4,855	B 4,875	B 4,915
	B 5,210	I 4,352	E 3,891	E 3,941	E 3,991
	E 3,794	E 3,844	I 2,351	C 1,911	C 1,911
	C 1,911	C 1,911	C 1,911	D 1,348	D 1,348
	D 1,348	D 1,348	D 1,348	A 1,295	A 1,295
	A 1,295	A 1,295	A 1,295	I 349	I -1,653
17	I 9,697	I 7,696	I 5,695	B 4,875	B 4,915
	B 6,882	B 5,912	B 4,950	E 3,941	E 3,991
	E 3,794	E 3,844	E 3,891	I 3,693	C 1,911
	C 1,911	C 1,911	C 1,911	C 1,911	I 1,691
	D 1,348	D 1,348	D 1,348	D 1,348	D 1,348
	A 1,295	A 1,295	A 1,295	A 1,295	A 1,295

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[1] Letters A through E indicate the different contracts. I indicates independent.

[2] Feed priced $5 higher for contract production than for noncontract production.

Table 7.--Estimated net hourly returns to growers for labor and management for 100,000 broilers under different production arrangements and with varying broiler and feed prices 1/

Broiler price per pound	Contract feed price per ton 2/				
	$80	$85	$90	$95	$100
	Net hourly returns				
	Dollars				
13	B 2.40	B 2.41	B 2.43	B 2.44	B 2.46
	E 1.90	E 1.92	E 1.95	E 1.97	E 2.00
	C .96	C .96	C .96	C .96	C .96
	D .67	D .67	D .67	D .67	D .67
	A .65	A .65	A .65	A .65	A .65
	I -1.84	I -2.84	I -3.84	I -4.84	I -5.84
14	B 2.40	B 2.41	B 2.43	B 2.44	B 2.46
	E 1.90	E 1.92	E 1.95	E 1.97	E 2.00
	C .96	C .96	C .96	C .96	C .96
	D .67	D .67	D .67	D .67	D .67
	A .65	A .65	A .65	A .65	A .65
	I -.17	I -1.17	I -2.17	I -3.17	I -4.17
15	B 2.40	B 2.41	B 2.43	B 2.44	B 2.46
	E 1.90	E 1.92	E 1.95	E 1.97	E 2.00
	I 1.50	C .96	C .96	C .96	C .96
	C .96	D .67	D .67	D .67	D .67
	D .67	A .65	A .65	A .65	A .65
	A .65	I .50	I -.50	I -1.50	I -2.50
16	I 3.18	B 2.41	B 2.43	B 2.44	B 2.46
	B 2.61	I 2.18	E 1.95	E 1.97	E 2.00
	E 1.90	E 1.92	I 1.18	C .96	C .96
	C .96	C .96	C .96	D .67	D .67
	D .67	D .67	D .67	A .65	A .65
	A .65	A .65	A .65	I .17	I -.83
17	I 4.85	I 3.85	I 2.85	B 2.44	B 2.46
	B 3.44	B 2.96	B 2.48	E 1.97	E 2.00
	E 1.90	E 1.92	E 1.95	I 1.85	C .96
	C .96	C .96	C .96	C .96	I .85
	D .67	D .67	D .67	D .67	D .67
	A .65	A .65	A .65	A .65	A .65

1/ Letters A through E indicate different contracts. I indicates independent.

2/ Feed priced $5 higher for contract production than for noncontract production.

The independent producer must pay all costs, and variations in the price of feed greatly affect his net income. With broilers at 15 cents per pound and feed at $75 per ton (the equivalent of $80 per ton for contract growers), the independent grower's net return is $3,009. If he pays $95 per ton for feed (the equivalent of $100 paid by contract growers), he loses $4,997.

Contract B is the only contract with a profit-sharing clause. Producers under this contract are the only contract producers affected by broiler prices. With broilers priced at 16 cents per pound and feed at $85 per ton, contract B growers receive returns of $4,815; with broilers at 17 cents, they receive $5,912. The increase in price for contract B growers actually begins as soon as the price for broilers reaches 16.3 cents per pound, because this price (with feed at $85) is high enough to cover the prime cost of production. Any income above this cost is profit to be split between the contract firm and the producer.

In previous years, market price was frequently used in determining grower payments. As the volume of broilers outside contract production decreased and as farm price quotes were discontinued, market prices were used less frequently in contract payment plans.

The relationship between feed cost and the price per pound is illustrated clearly in table 6 for the independent grower. Under the assumed conditions, the returns to the independent grower would be negative if broilers were 14 cents per pound or less at any feed price considered.

There was a very wide range in grower returns under various contracts for a given set of conditions. In all combinations of feed and broiler prices, contract B gave the highest grower return. In contract B the contractor furnished heat and this lowered the estimated grower cost by $716. The difference in input cost accounted for a great part of the advantage contract B had over the other contracts.

Over the range of feed conversion efficiency, the general position of the contracts to one another as determined by growers' returns was unchanged except at the less efficient level of 2.4 where contract D replaced contract C as the third ranking contract in terms of returns to growers. Feed conversion is one factor over which the grower has some control, and better management practices can result in added income for the grower.

Returns to an independent grower are directly affected by the cost of feed and the price of broilers. The information in tables 6 and 7 illustrates the high returns possible with a high price for broilers and a low price for feed. However, there is also the possibility of large losses if price is low and feed cost is high.

In 1961-62, it was estimated that 50 to 60 percent of the turkeys produced were grown under some type of contractual arrangement between growers and other firms or were grown by firms owning both production and other facilities such as hatcheries, feed mills, or processing plants.

Types of contracts used in the turkey industry have evolved from financing contracts, which are still used in some areas, to risk-sharing contracts. Financing contracts are contracts used for extension of credit to producers for all or part of the feed and other production supplies. Under such contracts, the turkeys are owned by the producer, and the loan is generally secured by a mortgage. These contracts differ from ordinary loans in that the contractor may participate in management decisions. Risk-sharing contracts involve a sharing or transferring of production risk. They have been used for more than 20 years in Virginia and some areas of California.

Profit-sharing contracts were the earliest of the risk-sharing contracts used in the industry. Under the early profit-sharing contracts, the contracting firm furnished the major inputs, and profit from the operation was split, with the producer receiving 90, 80, 70, or in some cases, 50 percent of the profit. This type of contract has been replaced in most areas.

Most profit-sharing contracts now in use include a minimum guarantee to the grower. Profit is split in some ratio with the guaranteed payment being counted as an expense. Some of these contracts also include incentive payments, such as a bonus payment for feed efficiency, that are counted as costs by the contractor.

Probably the most recent type of contract introduced into the industry is a minimum guaranteed payment contract which does not provide for profit sharing. Payment under many of these contracts is adjusted on factors such as mortality and feed conversion rates. This type of contract, in which grower payment is isolated from the effects of input and output prices, appears to be the direction that contracting may take in the turkey industry.

Types of Contracts Evaluated

Five types of turkey contracts, including the major types of payment plans, were evaluated. An independent operation was included in the analysis for a standard of comparison. The five contracts were:

Contract A (minimum guarantee plus profit sharing)

Grower received a guarantee of $1\frac{1}{2}$ cents per pound plus 50 percent of net profit after the guarantee and other costs of inputs furnished by the contractor were deducted from gross returns.

Contract B (minimum guarantee)

Grower received a guarantee of 2 cents per pound live weight passing inspection.

Contract C (cost of production--profit sharing)

In case of loss, the producer was guaranteed from 2 to 5 percent of the gross proceeds from the turkeys, depending on the amount of loss. A loss occurred if the gross proceeds from the turkeys did not cover the inputs supplied by the contractor. Following are the conditions specified in the guarantee:

Percentage of gross sales guaranteed in case of loss	Loss per turkey started	
	Bronze	Broiler
5 percent	Less than $0.250	Less than $0.120
3 percent	$0.251-$0.350	$0.121-$0.170
2 percent	More than $0.350	More than $0.170

If there was no loss, the grower received 70 percent of net profit after 5 percent of the gross sales was subtracted by the contractor as an expense.

Contract D (profit sharing)

Grower received 80 percent of the net profit remaining after costs of inputs furnished by the contractor were deducted from gross returns.

Contract E (feed conversion)

The grower was paid on total pounds passing inspection, based on feed conversion rate, as follows:

Feed conversion rate	Payment per pound
	Cents
4.0 and over	2.0
3.9	2.2
3.8	2.4
3.7	2.6
3.6	2.8
3.5 and less	3.0

In cold weather the grower was paid a heating allowance of 2 cents per poult.

Assumptions Underlying Economic Analyses

It was assumed that the grower was above average in husbandry and had equipment and brooding facilities for 5,000 turkeys and that two flocks per year were brooded in the facilities. Equipment for feeding turkeys on range was considered to be sufficient for two flocks.

Assumptions pertaining to size of operation and efficiency rates are given in table 8. Estimated mortality was set at 7 percent--a percentage which might be expected with good poults and careful management practices. Poults were considered to be straight run, and feed conversion was assumed to be 3.8 pounds of feed per pound of gain. (Surveys of actual feed conversion rates achieved in commercial turkey enterprises indicated that this factor fluctuated widely.)

The number of contracts available for study in making assumptions was limited. Supplemental information on contracts was obtained from other sources such as trade publications and testimony presented in Food Commission hearings. Coefficients used to determine production costs for contract and independent growers were derived from a survey of source material. Cost determination was difficult because sources varied in their estimates of turkey production costs and in the items that were included in figuring the costs. Feed, which accounts for 65 to 75 percent of the cost of producing turkeys, was the most difficult cost item to determine. Feed costs reported per pound of turkey produced varied.

Estimated production costs excluding labor and management are given in detail in table 9. Feed is valued at $70 per ton in this table. All cost items in table 9 would apply to the independent grower although different feed values may be used in different comparisons. (In tables where there is a comparison between production arrangements, feed will be priced $5 higher per ton for the contract grower.) Such cost items as apply to the contract growers are summarized in table 10. The fertilizer value of manure was assumed to offset the charge for rangeland and neither item was included in cost estimates.

Costs of inputs furnished by the contracting firm or the grower, excluding feed, were valued the same as the costs incurred by the independent grower.

Net returns to grower's for labor and management under the various production arrangements were calculated by subtracting the grower's cost from his gross return. In some cases, the gross return was less than the cost of production, in which case the grower had a negative return for labor and management.

Economic Comparison of Production Arrangements

Three comparisons were made of grower returns from the different production arrangements. Changes were made in feed prices, in the market price for turkeys, and in feed conversion rates to demonstrate the effect of each of these changes on production returns.

Table 8.--Assumptions underlying economic comparisons of turkey contracts

Item	Unit	Quantity
Poults started (two broods, straight run)	Number/year	10,000
Mortality, 7 percent	Number/year	700
Turkeys marketed	Number/year	9,300
Average weight of turkeys marketed	Pounds	20
Gross weight of turkeys marketed	Pounds/year	186,000
Condemned in plant, 1.5 percent	Pounds/year	2,790
Net weight of turkeys marketed	Pounds/year	183,210
Feed per pound of turkey marketed (gross weight)	Pounds	3.8
Total feed used	Hundredweight/year	7,068
Estimated labor inputs per 10,000 turkeys	Hours/year	1,500

Growers' Net Returns Under Changing Feed Prices

To demonstrate the effects of feed cost on returns, growers' returns were calculated at four different contract feed prices. The live-weight price of turkeys was held constant at 22 cents per pound--the 1964-66 average price. All other factors were held constant at levels shown in table 8.

Since feed made up 70-75 percent of turkey production costs, returns under contracts A, C, and D--the contracts with all or part of the payments dependent on profit sharing--decreased as the price of feed increased.

Returns to the independent grower decreased with an increase in feed prices, but he received a greater return than any of the contract growers for labor and management until the contract feed price went above $85 per ton. By the time the feed price reached $90 per ton, returns under contracts E, B, and A were greater than for the independent (fig. 2).

At a contract feed price of $75 per ton, returns under contracts C and D were significantly greater than under the other contracts. However, at $80 per ton, growers' returns under contracts C and D decreased; in fact, contract E now gave a greater net return than D. With a contract feed price of $85 per ton, contract C was no longer the best in terms of growers' returns. At $85, contracts B and E attained a sizable advantage over the other contracts. At a contract feed price of $90 per ton, these two contracts possessed an even greater advantage, since under contracts C and D there was a negative return to labor and management.

Table 9.--Cost budget: Estimated costs (excluding labor and management) of producing 10,000 turkeys

Production item	Total annual cost	Cost per net pound of turkey produced
	Dollars	Dollars
Fixed costs:		
Buildings--depreciation and repair 1/	400	.00218
Equipment--depreciation and repairs 2/	715	.00390
Buildings and equipment--interest on average investment 3/	322	.00176
Buildings and equipment--insurance and taxes 4/	213	.00117
Total fixed costs	1,650	.00901
Variable costs:		
Feed 5/	24,738	.13503
Poults	5,950	.03248
Insurance	458	.00250
Heat	300	.00164
Medication	270	.00147
Litter	250	.00136
Electricity	70	.00038
Miscellaneous	400	.00218
Financing charge	550	.00300
Total variable costs	32,986	.18004
Total costs	34,636	.18905

1/ Brooding house of 5,000 square feet or 1 square foot per poult. Total cost of $5,000 ($1 per square foot). Variations in cost expected because of locality and quality of material used. Depreciation and repair based on 8 percent of cost.

2/ Equipment cost of $5,720. Amount and types of equipment based on manufacturers' and poultry specialists' recommendations found in publications and trade magazines. Depreciation and repairs based on 12.5 percent of cost.

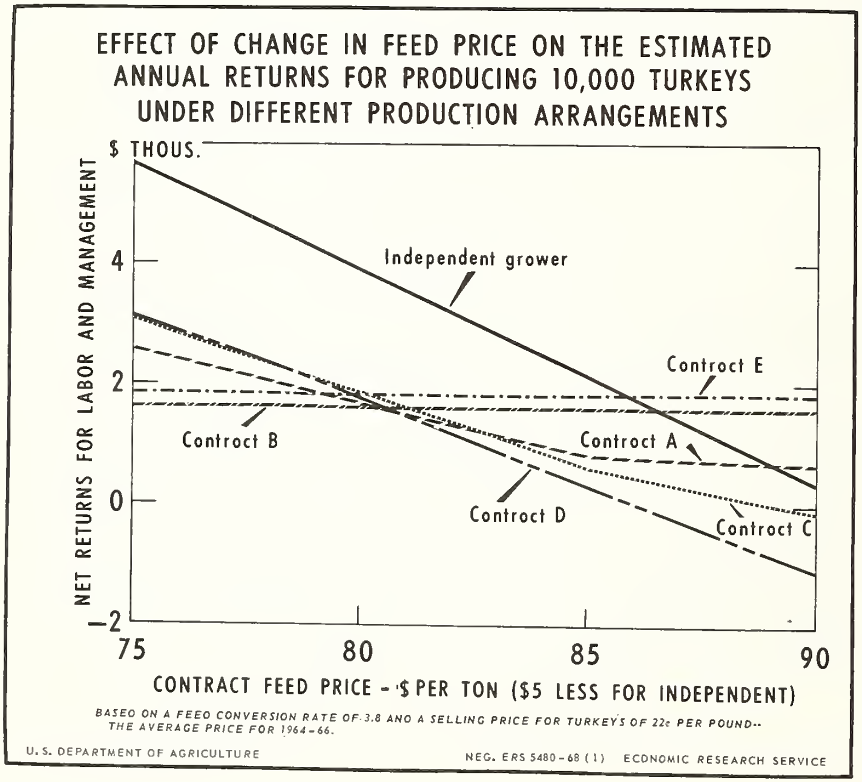
3/ Interest on average investment of $5,000 + $5,720/2 x 6 percent = $322.

4/ Two percent insurance and taxes on buildings and equipment.

5/ Feed valued at $70 per ton. (In tables comparing production arrangements feed will be priced $5 higher per ton for contract growers than for independent growers.)

Table 10.--Turkey growers' production costs under various contract types

Production arrangement	Production item: Fixed costs	Heat	Litter	Electricity	Miscellaneous	Total grower cost excluding labor and management
	Dollars					
A	1,650	---	---	---	400	2,050
B	1,650	---	---	---	400	2,050
C	1,650	---	---	70	400	2,120
D	1,650	---	---	70	400	2,120
E	1,650	300	250	70	400	2,670


EFFECT OF CHANGE IN FEED PRICE ON THE ESTIMATED ANNUAL RETURNS FOR PRODUCING 10,000 TURKEYS UNDER DIFFERENT PRODUCTION ARRANGEMENTS

BASED ON A FEED CONVERSION RATE OF 3.8 AND A SELLING PRICE FOR TURKEYS OF 22¢ PER POUND-- THE AVERAGE PRICE FOR 1964-66.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 5480-68 (1) ECONOMIC RESEARCH SERVICE

Figure 2

Growers' Returns with a Change in Feed Conversion Efficiency and Feed Prices

In contracts A, C, and D, grower payment was dependent upon input costs, market price, and production efficiency. In these contracts, the grower had negligible control over input costs and market price once the contract has been entered into. Production efficiency was the one factor which the grower could affect to any extent. In contract E, production efficiency as measured by feed conversion efficiency determined grower payment, which was thus independent of input costs and market price. Under contract B, grower payment was at a flat rate independent of any of these factors, including feed conversion rates.

Changes in growers' returns resulting from increased feeding efficiency are shown in table 11. The feed conversion rate of 3.6 represents an increase in feeding efficiency over the rate of 3.8 assumed in table 8.

With this increase in feed conversion efficiency, returns under all production arrangements except contract B increased. Returns to an independent grower were greater than returns under contract at contract feed prices of $75, $80, and $85 per ton. At $90 per ton, returns from contract E were greater than returns under the other production arrangements.

At the more efficient feed conversion rate, and with feed at $75 per ton, contracts D and C returned more to the grower than any other contracts. At $80 per ton, contracts D and C still offered greater returns than other contracts, but the differences were not as great as they were at $75 per ton.

Contract E gave greater returns at $85 per ton than the other contracts, but with the feed conversion rate of 3.6 its advantage over all contracts except B was less than with the less efficient feed conversion rate of 3.8. This reflects the fact that returns under contract E do not depend on the price of feed.

At $90 per ton for feed, growers under contracts B and E received greater returns than growers under the other contracts. Contracts C and D gave negative returns at a feed conversion rate of 3.8. Contract E's advantage over contract B was significantly greater at a conversion rate of 3.6 than at 3.8.

Growers' Net Returns with Changes in Market Price and Feed Price

Changes in growers' returns at various market prices and feed prices are given in table 12. With feed at $75 per ton for contract growers and the market price for turkeys at 20 cents per pound, returns to independent growers were greater than to contract growers. Net returns under contracts E and B were unchanged in total, but became more favorable relative to other contracts as feed prices increased. At a price of 20 cents per pound for turkeys, contracts E and B gave greater returns than the other contracts at all feed prices, and at feed prices over $75 per ton, returns for E and B were greater than for the other contracts and for the independent producer as well.

Table 11.--Changes in annual net returns to growers for 10,000 turkeys with changes in feed conversion efficiency and feed prices 1/

Production arrangement	Contract feed price per ton 2/							
	$75		$80		$85		$90	
	Feed conversion		Feed conversion		Feed conversion		Feed conversion	
	3.6	3.8	3.6	3.8	3.6	3.8	3.6	3.8
	Dollars							
Contract A:								
Gross return.	5,323	4,626	4,486	3,742	3,469	2,859	2,812	2,748
Net return...	3,273	2,576	2,436	1,692	1,599	809	962	698
Contract B:								
Gross return.	3,664	3,664	3,664	3,664	3,664	3,664	3,664	3,664
Net return...	1,614	1,614	1,614	1,614	1,614	1,614	1,614	1,614
Contract C:								
Gross return.	6,182	5,206	5,010	3,969	3,839	2,732	2,667	2,015
Net return...	4,062	3,086	2,890	1,849	1,719	612	547	-105
Contract D:								
Gross return.	6,374	5,258	5,035	3,845	3,696	2,431	2,357	1,018
Net return...	4,254	3,138	2,915	1,725	1,576	311	237	-1,102
Contract E:								
Gross return.	5,230	4,497	5,230	4,497	5,230	4,497	5,230	4,497
Net return...	2,560	1,827	2,560	1,827	2,560	1,827	2,560	1,827
Independent grower:								
Gross return.	40,306	40,306	40,306	40,306	40,306	40,306	40,306	40,306
Net return...	6,972	5,670	5,298	3,903	3,624	2,136	1,950	369

1/ Other assumptions are the same as those in table 8 except price of turkeys which is assumed to be 22 cents per pound, the 1964-66 average price to the nearest cent.

2/ Feed priced $5 higher for contract production than for noncontract production.

Table 12.--Annual net returns to labor and management for producing 10,000 turkeys under different production arrangements and with varying turkey and feed prices [1]

Cents per pound	Contract feed price per ton [2]											
	$75			$80			$85			$90		
	Production arrangement	Net returns		Production arrangement	Net returns		Production arrangement	Net returns		Production arrangement	Net returns	
		Total	Per hour		Total	Per hour		Total	Per hour		Total	Per hour
		Dollars			Dollars			Dollars			Dollars	
20.....	I	2,006	1.34	E	1,827	1.22	E	1,827	1.22	E	1,827	1.22
	E	1,827	1.22	B	1,614	1.08	B	1,614	1.08	B	1,614	1.08
	B	1,614	1.08	A	698	.47	A	698	.47	A	698	.47
	A	744	.50	I	239	.16	C	-288	-.19	C	-288	-.19
	C	466	.31	C	-288	-.19	I	-1,528	-1.02	D	-2,120	-1.41
	D	207	.14	D	-1,206	-.80	D	-2,120	-1.41	I	-3,295	-2.20
21.....	I	3,838	2.56	I	2,071	1.38	E	1,827	1.22	E	1,827	1.22
	E	1,827	1.22	E	1,827	1.22	B	1,614	1.08	B	1,614	1.08
	C	1,776	1.18	B	1,614	1.08	A	698	.47	A	698	.47
	D	1,673	1.12	A	776	.52	I	304	.20	C	-196	-.13
	A	1,660	1.11	C	539	.36	C	-196	-.13	I	-1,463	-.98
	B	1,614	1.08	D	259	.17	D	-1,154	-.77	D	-2,120	-1.41
22.....	I	5,670	3.78	I	3,903	2.60	I	2,136	1.42	E	1,827	1.22
	D	3,138	2.09	C	1,849	1.23	E	1,827	1.22	B	1,614	1.08
	C	3,086	2.06	E	1,827	1.22	B	1,614	1.08	A	698	.47
	A	2,576	1.72	D	1,725	1.15	A	809	.54	I	369	.25
	E	1,827	1.22	A	1,692	1.13	C	612	.41	C	-105	-.07
	B	1,614	1.08	B	1,614	1.08	D	311	.21	D	-1,102	-.73
23.....	I	7,502	5.00	I	5,735	3.82	I	3,968	2.65	I	2,201	1.47
	D	4,604	3.07	D	3,190	2.13	C	1,922	1.28	E	1,827	1.22
	C	4,396	2.93	C	3,159	2.11	E	1,827	1.22	B	1,614	1.08
	A	3,492	2.33	A	2,608	1.74	D	1,777	1.18	A	841	.56
	E	1,827	1.22	E	1,827	1.22	A	1,725	1.15	C	685	.46
	B	1,614	1.08	B	1,614	1.08	B	1,614	1.08	D	363	.24

[1] I indicates independent. A through E indicate the different contracts.
[2] Feed priced $5 higher for contract production than for noncontract production.

Under the assumption that the live-weight price per turkey was 22 cents per pound and contract feed prices were $75, $80, or $85 per ton, returns to the independent grower were greater than returns under any of the contracts.

With an increase in price of turkeys to 23 cents, the returns to the independent grower were greater than returns under any of the contracts at all feed prices considered, but net returns did decrease as the price of feed increased. At a market price of 23 cents, contract D had a greater producer return than C below an $85 feed cost; from $85 on, C ranked higher than D. Both C and D possessed a significant advantage over other contracts at feed prices of $75 and $80, but at $85, the margin of returns for C over the other contracts was not as great and E became more favorable than D. At $90 contracts E and B were the most advantageous.

With an increase in market price from 22 cents to 23 cents, returns to growers under all profit-sharing contracts (A, C, D) increased.

TABLE EGG GROWING ARRANGEMENTS

Contract Production in the Table Egg Industry

Contracts have not been used in the table egg industry to the extent that they have been in either the broiler or turkey industry. However, as egg production has shifted to the South, there has been considerable contracting there. Although no national figures are available to show the extent of change in contracting, estimates of production and contracting from three Southern States suggest that production increases have occurred where contracts have been extensively used (table 13).

Table 13.--Egg production increases in three Southern States 1/

State	Increase in egg production, 1959-65	Estimated production under contract
	Percent	
Alabama	71	45
Georgia	72	33
Arkansas	159	More than 50

1/ The estimates on contract production are based on reports by poultry extension workers and for the most part reflect the situation in 1964.

Contracts have changed over time, and there are many variations of contracts now in use. Some of these changes are regional yet many are simply modifications. Contracts change more rapidly during the early periods of their use and after some time tend to settle down to specified types in a given area.

The guaranteed price per dozen was one of the earlier contracts. An advantage of this type of contract was the ease of calculating the payment to the grower and the certainty the grower had of receiving a specified price. However, unless special arrangements were made, growers did not receive any payment until the chickens were in production. This was one of the factors that led to modifications of this contract and the emerging of others.

Contracts guaranteeing payment per bird, week, or month evolved in part to give growers payment before there was any significant production from the layers. Later contracts of this type had a bonus payment per dozen eggs depending on feed conversion rate and the price received by the contractor for the eggs.

Profit-sharing contracts were devised to offer an incentive to growers to improve management. Under these contracts the gross receipts less expenses of the contractor were divided between the grower and the contractor. One of the major difficulties in such contracts is determination of profit, particularly if there are costs that have to be allocated to different operations. Also, if the inputs furnished by the contractor contained a profit markup, the contractor could make a profit on his operation even though there were no net profits to share, and the grower would not receive anything for his inputs. This type of profit-sharing contract is used very infrequently now, but profit sharing is still retained as a bonus clause in some contracts now in use.

Contracts that guarantee a payment per dozen eggs produced are probably the most prevalent type used today, especially in the South. Bonus payments have been added to the original flat payments and many contracts have a guaranteed minimum that may be increased as the price received by the contracting firm increases.

The contract providing for a division of gross receipts is the most recently devised type used for egg production. It was tried for broiler production but did not gain widespread acceptance. It has been used successfully, primarily in the Midwest, in two- or three-party contracts with gross receipts divided according to the relative value of the inputs furnished by each party. The advantages claimed for this method of payment are that returns are distributed according to the contribution of each party, and risk is shared by all involved. Also, the calculation of the payment is relatively easy. A disadvantage is that there could be difficulties in agreeing on the value of the inputs and thus in the division of gross receipts. Again, the price of inputs could change during the contract period and put one party at a disadvantage relative to the others.

Types of Contracts Evaluated

Four egg production contracts were selected for analysis and for comparison with returns for an independent grower.

Contract A (feed conversion--minimum guarantee)

This contract guarantees a basic payment per dozen with a bonus based on feed conversion. The grower receives 1 cent per pullet per week for the first 18 weeks of the period, after which time he receives income from egg production. The net returns for growing the pullets are not calculated for contract A.

Contract B (feed conversion, rate of lay--minimum guarantee)

A guaranteed price is paid per dozen, plus a bonus per dozen based on feed conversion and rate of lay.

Contract C (feed conversion, rate of lay--market price)

This contract guarantees a specified payment per dozen, depending on the price the contractor receives for eggs. A bonus is paid based on feed conversion and rate of lay.

Contract D (division of gross receipts)

The gross receipts are divided between the contracting parties. The division is determined by the contribution to the cost of production of the items furnished by the contracting parties.

Appendix B gives additional information from the payment plans used in contracts A through D. Some of these payment plans were not clear on a number of points. In contract C, for example, if the market price were exactly 30 cents per dozen the grower could be paid either 4 or 5 cents per dozen depending on how the contract was interpreted. In this report, a price of 30 cents per dozen was considered as falling in the price range paying 4 rather than 5 cents per dozen. Payment to the grower would be 5 cents per dozen when the market price was higher than 30 cents.

Assumptions Underlying the Economic Analysis

To evaluate returns to growers under different types of contracts and under noncontract production, a budget was estimated for a flock of 10,000 layers. This particular flock size was chosen because many studies indicate that most economies of scale under the specified growing technology (floor management) are realized at this size of enterprise. Costs for larger operations could be multiples of this basic budget. The budget is intended to be used only as representing reasonable assumptions of cost and performance and does not give the specific costs of any given situation.

The assumptions relating to the various coefficients used in the analysis of the laying flocks are given in table 14. In calculating a year's return to growers, pullets were assumed to be 18 weeks old at the beginning of the 52-week laying period. This is not the most productive 52-week laying period, but 18 weeks is the common age for started pullets, and it fits the specifications given in the contracts analyzed. The contracts generally indicated that the layers would be kept a minimum of 1 year. The age of the pullets provided the contract grower is important and may influence the grower in the type of contract he selects. Under contract A the contractor provided the grower with 18-week old pullets; under contract B, the contractor provided pullets approximately 16 to 20 weeks of age; under contract C, the contractor provided ready-to-lay or almost-ready-to-lay pullets. With contract C, the grower was paid 1 cent per week per pullet until the flock reached 50 percent production--around the 24th or 25th week. Returns to a grower paid on a per-dozen basis were very low during the first few weeks after the delivery of the pullets.

A higher total production than the 237 eggs specified in the assumption could be expected per layer during a 12-month period if the pullets were older than 18 weeks at the beginning of the period. The figure of 237 eggs per year is based on an expected production of 250 eggs per year for a 52-week period starting with 25-week-old pullets adjusted to a 52-week period starting with the pullets' 18th week.

The assumed yield of eggs and price per dozen eggs are shown in table 15 for all production arrangements except contract C. Table 16 gives yield and price per dozen for contract C.

Table 14.--Assumptions used in the analysis of returns to producers in table egg production

Item and unit	Amount
Depreciation and repairs:	
Buildings, percent	8.0
Equipment, percent	12.5
Insurance and taxes, percent	2.0
Interest on average investment, percent	6.0
Flock mortality, percent of layers	12
Feed conversion, pounds of feed per dozen eggs	4.2
Rate of lay, eggs per year	237
Pullet age at placement, weeks	18
Size of laying enterprise, chickens	10,000

Table 15.--Basic yield and price data used in estimating returns in all production arrangements except contract C, 52-week period

Grade	Yield by grade 1/	Total eggs	Average 1964-66	
			Price per dozen 2/	Total gross returns
	Percent	Dozen	Cents	Dollars
Grade A:				
Extra large.....	19.0	35,274	36.27	12,793.88
Large...........	47.0	87,256	33.92	29,597.24
Medium..........	20.0	37,130	28.62	10,626.61
Small...........	5.0	9,282	20.54	1,906.52
Peewee..........	.6	1,114	17.72	197.40
Grade B...........	2.0	3,713	21.54	799.78
Dirties...........	1.0	1,856	19.06	353.75
Cracks............	2.8	5,198	19.06	990.74
Blood spots.......	2.0	3,713	19.06	707.70
Other.............	.6	1,114	19.06	212.33
Total...........	100.0	3/185,650	31.34	58,185.95

1/ Estimated from data on egg yield by grade in Canada and from articles appearing in Poultry Digest and Feedstuffs.

2/ Calculated from information on egg prices in 10 selected areas taken from Poultry Market Statistics, Consumer & Marketing Service, U.S. Dept. Agr., Stat. Bul. No. 370, Mar. 1966, and Bul. No. 394, Mar. 1967, Washington, D.C.

3/ Total dozen based on production of 237 eggs per hen per year times the average of layers at beginning (10,000) and end (8,800, with 12 percent mortality) of the period, or 9,400 layers.

The study compared grower returns for egg production but not for growing of pullets. If the contractor furnishes baby chicks rather than pullets to the grower, an added investment by the grower is required. This is not a common practice, however, as there are contract growers who raise only started pullets, and can supply them at laying age for egg production.

Estimated costs of production excluding labor and management are given in detail in table 17. All of these cost items would apply to the independent producer; such of these costs as apply to contract growers are summarized in table 18. (In tables where there is a comparison between production arrangements, feed will be priced $5 higher per ton for the contract grower.)

Feed is the largest cost item, accounting for approximately 57 percent of cost when charged at $75 per ton. An interest charge was not added for the cost of feed as it was assumed that payment for eggs would be coming in at regular intervals and that the feed bills would be paid regularly rather than at the end of the period.

Table 16.--Contract price per dozen and total returns from 10,000 layers, contract C for 46-week period, at various market prices per dozen

Grade	Yield by grade	Total eggs	29.00 to 30.00 cents: Payment per doz.	29.00 to 30.00 cents: Total payment	31.00 cents: Payment per doz.	31.00 cents: Total payment
	Percent	Dozen	Cents	Dollars	Cents	Dollars
Grade A:						
Extra large	20.0	35,179	4	1,407.16	5	1,758.95
Large	48.0	84,431	4	3,377.24	5	4,221.55
Medium	19.0	33,420	4	1,336.80	5	1,671.00
Small	4.0	7,036	4	281.44	5	351.80
Peewee	0.6	1,055	3	31.65	3	31.65
Grade B	2.0	3,518	3	105.54	3	105.54
Dirties	1.0	1,759	3	52.77	3	52.77
Cracks and other	3.4	5,981	3	179.43	3	179.43
Blood spots	2.0	3,518	0	0	0	0
Total	100.0	175,897		6,772.03		8,372.69
Total payment (46 weeks) 1/				7,372.03		8,972.69

1/ Includes a payment of $600 for care of flock from 18th through 24th week.

The estimated cost for items furnished by the grower under each contract are shown in table 18. In general, the contracts were uniform in specifying the major items furnished by the parties to the contracts. A few minor items such as fillers and flats were not mentioned in the contracts. Contract C specified that the grower must furnish two men to help in loading the hens at the end of the laying period.

Economic Comparison of Production Arrangements

Grower returns for labor and management were compared for production under the four contracts and for the independent grower.

The price of eggs was set at 31 cents per dozen in all comparisons where price was held constant. This is the 1964-66 average price rounded to the nearest cent.

Growers' Returns With a Change in Feed Conversion

In all types of production arrangements except contract C, growers' returns were affected as feed conversion rates changed (table 19). A clause in contract C provided a bonus based on the relationship of feed conversion and rate of lay but at the rate of lay specified in the budget, no bonus would be paid.

Table 17.--Cost budget: Estimated annual budget for 10,000 laying chickens (excluding labor and management costs)

Item	Total cost	Annual cost	Cents per dozen eggs produced 1/
	Dollars	Dollars	Dollars
Fixed costs:			
Laying house	2/20,600		
Depreciation and repairs		1,648	.0089
Insurance and taxes		412	.0022
Interest		618	.0033
Equipment	3/12,000		
Depreciation and repairs		1,500	.0081
Interest		360	.0019
Insurance and taxes		240	.0013
Total fixed costs	32,600	4,778	.0257
Variable costs:			
Pullets - depreciation and mortality	17,500	14,860	.0801
Interest		668	.0036
Insurance		300	.0016
Taxes on flock		100	.0005
Feeds		4/29,240	.1575
Litter		235	.0013
Medicine		490	.0026
Electricity		294	.0016
Miscellaneous		529	.0029
Total variable costs	17,500	46,716	.2517
Total	17,500	51,494	.2774

1/ Total of 185,650 dozen eggs based on a rate of lay of 237 eggs per 52-week period starting at the 18th week; mortality assumed to be 12 percent.

2/ Estimated at 2 square feet per chicken plus 500 square feet of work space and egg room, for a total of 20,600 square feet. Cost was estimated at $1.00 per square foot.

3/ Equipment cost is average of costs listed in Kansas, North Carolina, Illinois, and Oklahoma studies.

4/ Feed cost based on feed conversion of 4.2 pounds of feed per dozen eggs at $75 per ton. (In tables comparing production arrangements feed will be priced $5 higher per ton for contract growers than for independent growers.)

Table 18.--Estimated cost of items furnished by grower in contract egg production 1/

Production arrangement	Fixed costs	Litter	Electricity	Loading labor	Miscellaneous	Total grower cost excluding labor
	-Dollars-					
Contract A.	4,778	235	294	---	529	5,836
Contract B.	4,778	2/235	294	---	529	5,836
Contract C.	4,778	2/235	294	40	529	5,876
Contract D.	4,778	235	294	---	529	5,836

1/ Cost estimates from table 15 except loading cost. Loading cost adapted from data on loading broilers.

2/ Party furnishing litter not specified, but assigned to grower because he generally has to supply the litter.

The greatest variation in grower returns was in independent production, with a decrease in returns of 23 percent as the feed conversion rate changed from 4.1 to 4.4. Net returns in contracts A and B decreased approximately 11 percent and contract D approximately 9 percent as feed conversion changed from 4.1 to 4.4 with contract B showing a $464 decrease in net income--the largest absolute decrease. These changes indicate that, although bonus clauses in contracts do reward the better growers, the degree of change in net income through a change in feed conversion rates is considerably less for contract than independent growers. Also, as illustrated by contract C, the bonus may be difficult to attain in some contracts.

Growers' Returns Under Varying Feed and Egg Prices

Contract growers are much more immune to change in the price of feed and eggs than the independent grower, and in times of low egg prices or high feed prices the contract growers have higher returns. The independent grower, however, receives all of the benefit from an increase in the price of eggs, and in years of high prices has a higher profit than contract growers.

The relationship between feed prices and net returns under all production arrangements is shown in figure 3. Feed is a direct cost to the independent grower; thus, the higher the feed cost the lower the return. Feed prices did not affect returns under any contract except contract D in which gross receipts are divided between contractor and grower.

With all other factors held constant, a change in the price of eggs changes net returns to the independent grower and to growers under contracts C and D (fig. 4). Returns under contract D increase as egg prices rise because the grower receives a share of total returns. In contract C, payment per dozen

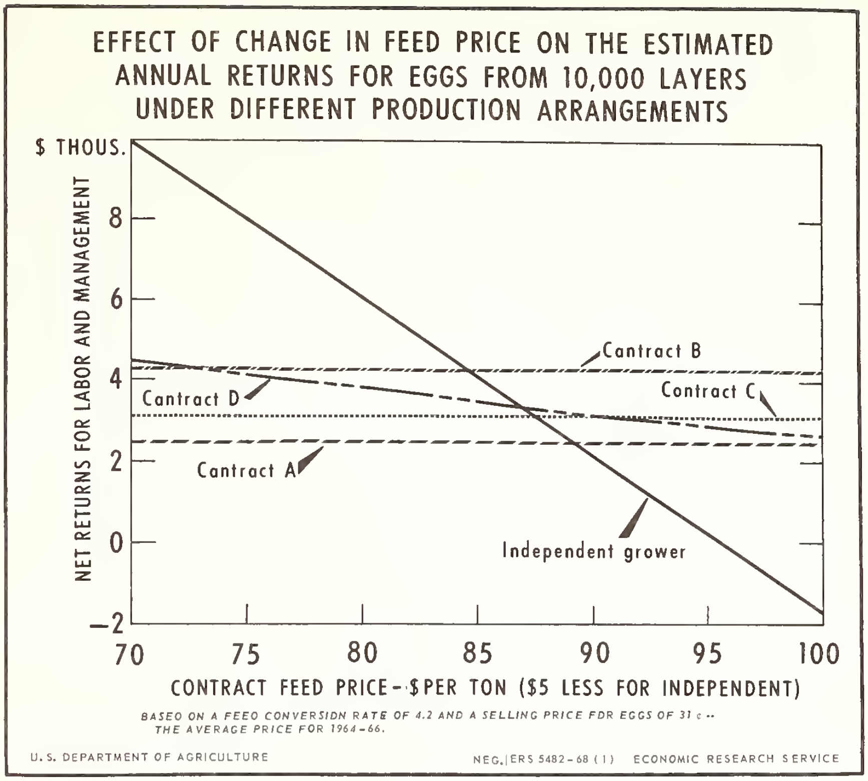
Table 19.--Changes in net returns to growers with changes in feed conversion rate, price held constant at $.31 per dozen and feed priced at $75 per ton for contract production

Production arrangement	Feed conversion 4.1	4.2	4.3	4.4
	Dollars	Dollars	Dollars	Dollars
Independent: 1/				
Gross return......	57,552	57,552	57,552	57,552
Cost..............	48,895	49,544	50,195	50,844
Net return........	8,657	8,008	7,357	6,708
Contract A:				
Gross return......	8,384	8,290	8,102	8,102
Cost..............	5,836	5,836	5,836	5,836
Net return........	2,548	2,454	2,266	2,266
Contract B:				
Gross return......	10,140	10,140	9,676	9,676
Cost..............	5,836	5,836	5,836	5,836
Net return........	4,304	4,304	3,840	3,840
Contract C:				
Gross return......	8,973	8,973	8,973	8,973
Cost..............	5,876	5,876	5,876	5,876
Net return........	3,097	3,097	3,097	3,097
Contract D:				
Gross return......	10,112	9,985	9,864	9,743
Cost..............	5,836	5,836	5,836	5,836
Net return........	4,276	4,149	4,028	3,907

1/ Feed priced at $70 per ton.

is tied to a price range--at 31 cents per dozen the payment is increased above that at 30 cents, and so on. With feed priced at $75 per ton, contract B is the best contract at all egg prices considered, but net returns would be greater to the independent grower at prices slightly above 29 cents per dozen.

The interaction between feed and egg prices for the different production arrangements is shown in table 20. For both contract D and the independent grower, an increase in feed prices will decrease grower returns relative to the other arrangements. An increase in the price of eggs has a positive effect on grower incomes for the independent grower and the grower under contract D and, up to a point, will overcome the decrease in net income caused by an increase in the price of feed.

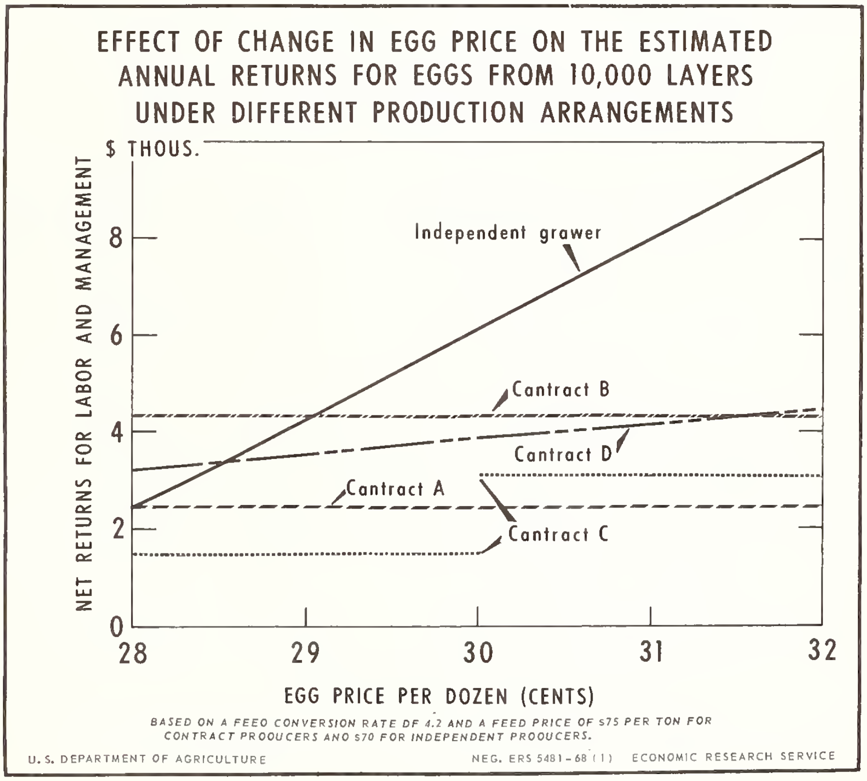


EFFECT OF CHANGE IN FEED PRICE ON THE ESTIMATED ANNUAL RETURNS FOR EGGS FROM 10,000 LAYERS UNDER DIFFERENT PRODUCTION ARRANGEMENTS

BASED ON A FEED CONVERSION RATE OF 4.2 AND A SELLING PRICE FOR EGGS OF 31 ¢ -- THE AVERAGE PRICE FOR 1964-66.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 5482-68 (1) ECONOMIC RESEARCH SERVICE

Figure 3



EFFECT OF CHANGE IN EGG PRICE ON THE ESTIMATED ANNUAL RETURNS FOR EGGS FROM 10,000 LAYERS UNDER DIFFERENT PRODUCTION ARRANGEMENTS

BASED ON A FEED CONVERSION RATE OF 4.2 AND A FEED PRICE OF $75 PER TON FOR CONTRACT PRODUCERS AND $70 FOR INDEPENDENT PRODUCERS.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 5481-68 (1) ECONOMIC RESEARCH SERVICE

Figure 4

Table 20.--Net returns to egg growers under different production arrangements with various egg and feed prices 1/

Feed price per ton for contract production	Egg price per dozen (cents)														
	28			29			30			31			32		
	Arrangement	Return: Total annual	Return: Per hour	Arrangement	Return: Total annual	Return: Per hour	Arrangement	Return: Total annual	Return: Per hour	Arrangement	Return: Total annual	Return: Per hour	Arrangement	Return: Total annual	Return: Per hour
	-Dollars-														
$70.......	I	4,387	1.75	I	6,244	2.50	I	8,100	3.24	I	9,956	3.98	I	11,813	4.73
	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	D	4,518	1.81	D	4,852	1.94
	D	3,516	1.41	D	3,850	1.54	D	4,184	1.67	B	4,304	1.72	B	4,304	1.72
	A	2,454	.98	A	2,454	.98	A	2,454	.98	C	3,097	1.24	C	3,097	1.24
	C	1,496	.60	C	1,496	.60	C	1,496	.60	A	2,454	.98	A	2,454	.98
$75.......	B	4,304	1.72	I	4,294	1.72	I	6,150	2.46	I	8,007	3.20	I	9,863	3.95
	D	3,183	1.27	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	D	4,471	1.79
	A	2,454	.98	D	3,505	1.40	D	3,827	1.53	D	4,149	1.66	B	4,304	1.72
	I	2,437	.97	A	2,454	.98	A	2,454	.98	C	3,097	1.24	C	3,097	1.24
	C	1,496	.60	C	1,496	.60	C	1,496	.60	A	2,454	.98	A	2,454	.98
$80.......	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	I	6,058	2.42	I	7,914	3.17
	D	2,876	1.15	D	3,187	1.27	I	4,201	1.68	B	4,304	1.72	B	4,304	1.72
	A	2,454	.98	I	2,345	.94	D	3,498	1.40	D	3,810	1.52	D	4,121	1.65
	C	1,496	.60	A	2,454	.98	A	2,454	.98	C	3,097	1.24	C	3,097	1.24
	I	488	.20	C	1,496	.60	C	1,496	.60	A	2,454	.98	A	2,454	.98
$85.......	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	I	5,965	2.39
	D	2,590	1.04	D	2,891	1.16	D	3,192	1.28	I	4,108	1.64	B	4,304	1.72
	A	2,454	.98	A	2,454	.98	A	2,454	.98	D	3,493	1.40	D	3,794	1.52
	C	1,496	.60	C	1,496	.60	I	2,252	.90	C	3,097	1.24	C	3,097	1.24
	I	-1,461	---	I	396	.16	C	1,496	.60	A	2,454	.98	A	2,454	.98
$90.......	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72
	A	2,454	.98	D	2,611	1.04	D	2,903	1.16	D	3,194	1.28	I	4,015	1.61
	D	2,320	.93	A	2,454	.98	A	2,454	.98	C	3,097	1.24	D	3,485	1.39
	C	1,496	.60	C	1,496	.60	C	1,496	.60	A	2,454	.98	C	3,097	1.24
	I	-3,411	---	I	-1,554	---	I	302	.12	I	2,159	.86	A	2,454	.98
$95.......	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72
	A	2,454	.98	A	2,454	.98	D	2,635	1.05	C	3,097	1.24	D	3,200	1.28
	D	2,070	.83	D	2,353	.94	A	2,454	.98	D	2,918	1.17	C	3,097	1.24
	C	1,496	.60	C	1,496	.60	C	1,496	.60	A	2,454	.98	A	2,454	.98
	I	-5,360	---	I	-3,503	---	I	-1,647	---	I	210	.08	I	2,066	.83
$100......	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72	B	4,304	1.72
	A	2,454	.98	A	2,454	.98	A	2,454	.98	C	3,097	1.24	C	3,097	1.24
	D	1,831	.73	D	2,105	.84	D	2,379	.95	D	2,653	1.06	D	2,927	1.17
	C	1,496	.60	C	1,496	.60	C	1,496	.60	A	2,454	.98	A	2,454	.98
	I	-7,309	---	I	-5,452	---	I	-3,596	---	I	-1,740	---	I	117	.05

1/ A through D indicate the different contracts. I indicates independent.
2/ Feed priced $5 higher for contract production than for noncontract production.

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APPENDIX A

Payment Plans for Broiler Contracts

Contract A

Payment plan:

Feed conversion rate	Grower payment per pound
	Cents
2.60 and above	1
2.50 to 2.59	1¼
2.40 to 2.49	1½
2.30 to 2.39	1 3/4
2.20 to 2.29	2
2.10 to 2.19	2¼
Below 2.10	2½

The payment is based on live weight passing inspection. Feed conversion is the total weight of feed consumed, divided by the total weight passing inspection.

Contract B

Payment plan:

a. $73 per thousand for average of prime cost (cost of feed, chicks, and other items furnished by the contractor) of all growers in 2 weeks previous to week in which broilers are sold.

b. Twenty cents per 1,000 chickens will be added for each 0.01 cent per pound the prime cost is less than the average prime cost. Twenty cents per 1,000 chickens will be deducted for each 0.01 cent per pound the prime cost is above the average prime cost.

c. The minimum payment will be $50 per thousand broilers started.

d. All profits over and above the above payments (and costs) to be divided equally.

Contract C

Payment Plan:

Grower paid on the basis of the amount of live weight at the processing plant less the live weight of broilers condemned by USDA. Payment may be based on the following schedule on all birds marketed during the 2 calendar weeks preceding the week chickens are sold.

The lowest production cost per pound and the lowest production cost per pound plus 3/4 cent will establish the interquartile efficiency range upon which payment will be based:

1. If grower cost ranks in the lower one-fourth of this range, 2¼ cents per pound.
2. If grower cost ranks in the second one-fourth of this range, 2 cents per pound.
3. If grower cost ranks in the third one-fourth of this range, 1 3/4 cents per pound.
4. If grower cost ranks in the highest one-fourth of this range, 1½ cents per pound.

All chickens, feed, and medical supplies will be charged at standard cost.

Contract D

Payment plan:

a. Base payment of 1½ cents per pound (all salable meat plus first 2 percent of condemned weight).

b. Bonus based on feed conversion and average weight (feed conversion and average weight determined before condemnation).

Grower Bonus Schedule

Meat per 100 lb. feed	Feed conversion	Average weight of birds				
		3.15 and under	3.16 to 3.30	3.31 to 3.45	3.46 to 3.60	3.61 and up
		Cents per lb.				
Up to 49.6	Under 2.00	.80	.90	1.00	1.10	1.20
49.5-48.6	2.01-2.05	.65	.75	.85	.95	1.05
48.5-47.4	2.06-2.10	.50	.60	.70	.80	.90
47.3-46.3	2.11-2.15	.35	.45	.55	.65	.75
46.2-45.3	2.16-2.20	.20	.30	.40	.50	.60
45.2-44.3	2.21-2.25	.05	.15	.25	.35	.45
44.2-43.3	2.26-2.30	0	0	.10	.20	.30
43.2-42.4	2.31-2.35	0	0	0	.05	.10
42.3 and under	2.36 and up	0	0	0	0	0

Contract E

Payment plan:

Based on prime production cost. Grower's prime production cost per pound for each flock is calculated. (Production cost is exclusive of grower payment.) Payment is based on how grower's cost compares with other growers' costs under contract.

Grower receives 2 cents per pound plus the full amount of the difference between his flock prime cost and the average prime cost if his flock prime cost is less than the average prime cost.

Grower receives 2 cents per pound minus the full amount of the difference between his flock prime cost and the average prime cost if his flock prime cost is more than the average prime cost.

All costs and payments based on live pounds produced exclusive of condemned pounds.

Grower payment will not be less than 1.5 cent per pound, exclusive of condemnation.

APPENDIX B

Payment Plans for Table Egg Contracts

Contract A

Payment plan:

Beginning with the 18th week (after delivery), the grower is paid by the following schedule. Before the 18th week, the grower receives 1 cent per head per week based on an average of the number delivered and the number alive at 18 weeks.

Grade	Cents per dozen
Grade A large and larger..................	5
Grade A medium and small..................	4
Grade A peewees, Grade B, checks, cracks, stains..........................	1
Blood spots, leakers, rotten.............	0

Bonus payments:

A bonus is paid to the grower based on the feed conversions given below:

Feed conversion	Bonus, cents per hen
4.3 or over	0
4.29-4.25	1
4.24-4.15	2
4.14-4.05	3
4.04-3.95	4
3.94-3.85	5
3.84-3.75	6
3.74-3.65	8
3.64-3.55 or under	10

The bonus is paid on the average number of hens during the period, which is the number of pullets placed plus the number of hens at the end of the laying period divided by two.

Contract B

Payment plan:

The producer is paid by the following schedule:

Grade	Payment
Grade A and AA	5 cents per dozen
Cracks	2 cents per dozen
Other undergrades	$3\frac{1}{2}$ cents per dozen

Bonus payments:

A bonus is paid the grower based on feed conversion and egg production.

Egg production and feed conversion bonus chart

Lbs. of feed per dozen eggs	252 and over	246 to 251	240 to 245	234 to 239	228 to 233	222 to 227	216 to 221	210 to 215	209 or less
	Cents per dozen								
Up to 3.49	1.75	1.65	1.55	1.45	1.35	1.25	1.15	1.05	.95
3.50-3.74	1.50	1.40	1.30	1.20	1.10	1.00	.90	.80	.70
3.75-3.99	1.25	1.15	1.05	.95	.85	.75	.65	.55	.45
4.00-4.24	1.00	.90	.80	.70	.60	.50	.40	.30	.20
4.25-4.49	.75	.65	.55	.45	.35	.25	.15	.05	.00
4.50-4.74	.50	.40	.30	.20	..10	.00	.00	.00	.00
4.75 and up	.25	.15	.05	.00	.00	.00	.00	.00	.00

Contract C

Payment plan:

One cent is paid per week on the number of pullets delivered until flock reaches 50 percent production.

Payment plan when flock reaches 50 percent production for three consecutive days: Payment for all Grade A small, medium, large, or extra large is:

Producer receives	Market price received by contractor
Cents per doz.	Cents per doz.
3	28 or less
4	28-30
5	30-37.5
6	37.5-40
7	more than 40

Three cents per dozen will be paid for all checks, dirties, peewees, Grade B's, etc.

Bonus amount, in cents per hen housed, to be paid for feed efficiency and production per terms of this contract. Bonus payments will be based on the following schedule:

	Bonus schedule, cents/hen housed per year					
Feed conversion rate	Eggs/hen housed					
	240.0-245.99	246.0-251.99	252.0-257.99	253.0-263.99	264.0-269.99	270.0 and over
3.7-3.79	.10	.11	.12	.13	.14	.15
3.8-3.89	.09	.10	.11	.12	.13	.14
3.9-3.99	.08	.09	.10	.11	.12	.13
4.0-4.09	.07	.08	.09	.10	.11	.12
4.1-4.19	.06	.07	.08	.09	.10	.11
4.2-4.29	.05	.06	.07	.08	.09	.10

Hens housed:

Total number of hens on hand when payment begins.

Eggs:

Total eggs received by company or its representative.

Contract D

Payment plan:

The gross proceeds from the sale of the eggs is divided according to the relative contribution of the inputs furnished by each party. An estimated cost of labor is included as one of the grower's contributions along with buildings, equipment, and other costs.

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